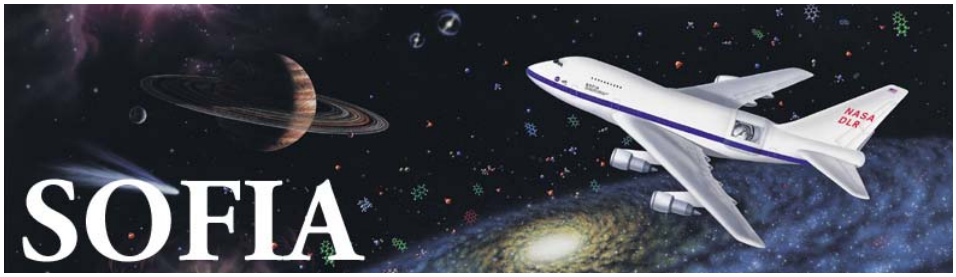
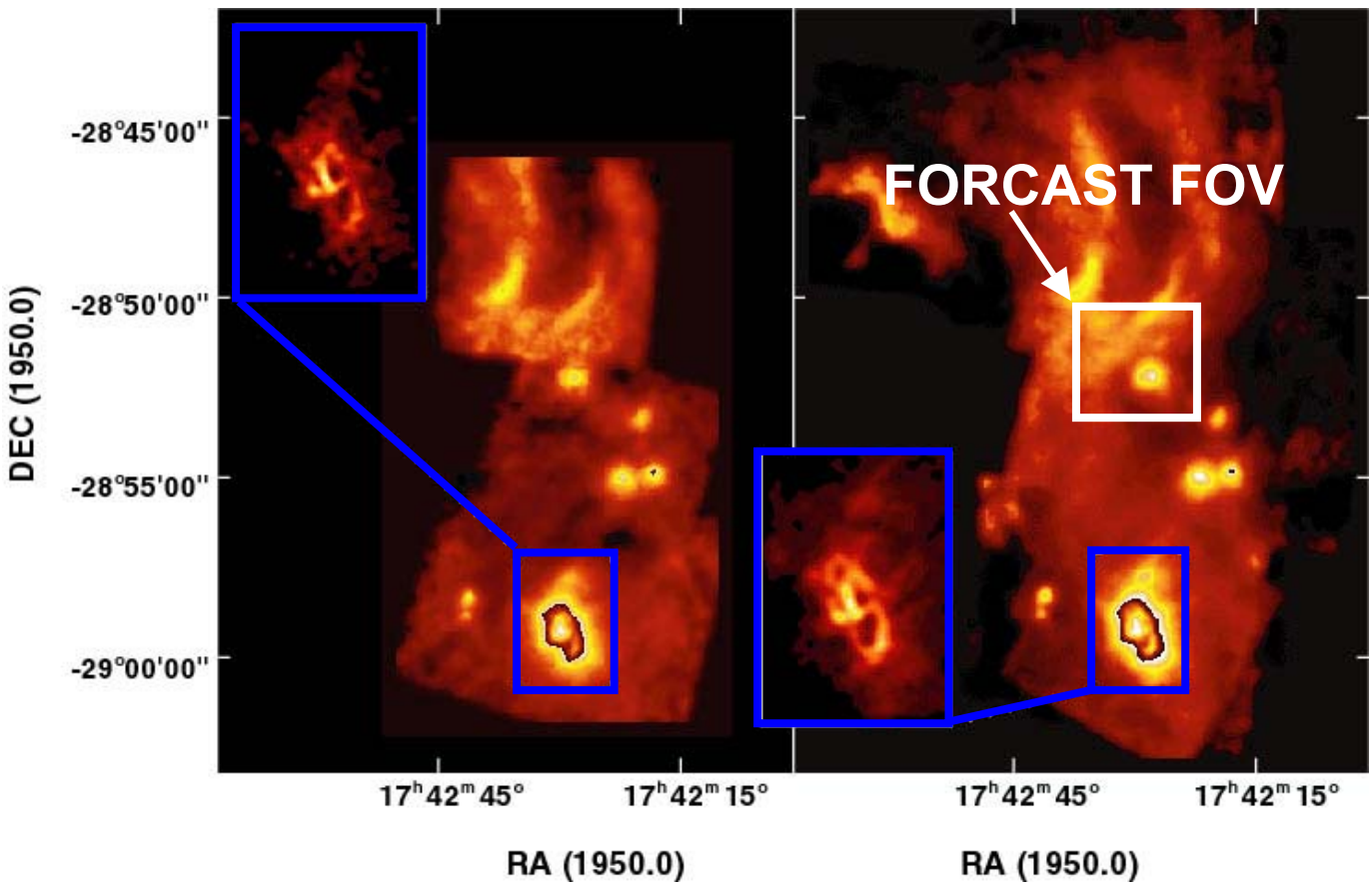


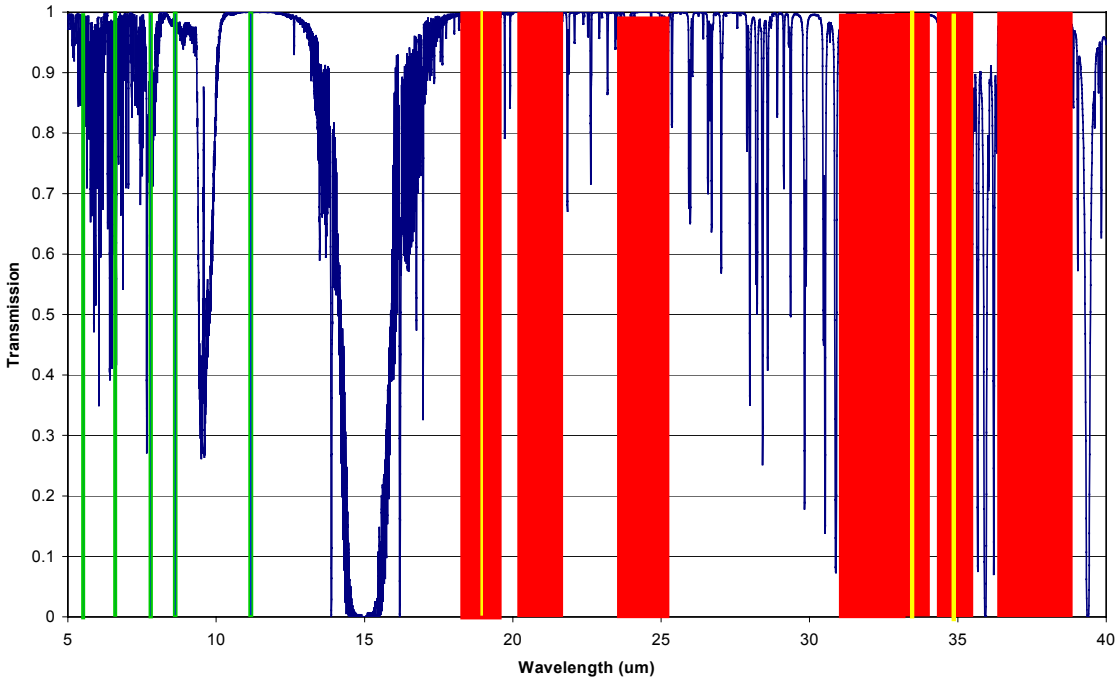
FORCAST:

The Faint Object infraRed CAmera for the Sofia Telescope

FORCAST is a facility-class, mid-infrared camera for the Stratospheric Observatory for Infrared Astronomy (SOFIA). FORCAST has two-channels with selectable filters for narrowband and broadband imaging in the 5-8, 17-25, and/or 25-40 μm regions. Simultaneous imaging in the two-channels ($\lambda < 25$ μm and $\lambda > 25$ μm) is possible. Using 256 x 256 Si:As and Si:Sb blocked-impurity-band detector array technology, FORCAST will sample images at 0.75 arcsec/pixel and will have a 3.2 x 3.2 arcminute instantaneous field-of-view. Imaging is diffraction-limited for $\lambda > 15$ μm. Since FORCAST operates in the wavelength range where the seeing from SOFIA is best, it will provide the highest spatial resolution possible from SOFIA. The science projects planned by the investigator team include multicolor imaging of the galactic center, Vega-like circumstellar dust envelopes, and star formation regions in normal and active galaxies. This instrument will be of great value to the astronomical/astrophysical community for imaging of protostellar environments, young star clusters, molecular clouds, and galaxies. Multicolor information will allow determination of dust temperatures, dust optical depths (and dust masses), dust composition, location of ionizing sources, and the spatial morphology of star forming regions. For a detailed technical description of the FORCAST design, see Keller *et al.*, 2000, SPIE Proceedings, Volume 4014. The image below illustrates the capabilities of FORCAST: these are mages of the Galactic Center obtained on the Kuiper Airborne Observatory with 5.7" spatial resolution. The FORCAST field of view is indicated by the white box. Inset blue-framed boxes are magnified images of the central spiral structure surrounding Sag A* with spatial resolution enhanced using a Lucy-Richardson deconvolution. FORCAST will have a factor of ~2-3 better spatial resolution.



Specifications



Commercial off the shelf Line and Continuum Filters

Double Half Wave Interferometer Continuum Filters

Line Filters (Double Half Wave or Fabry-Perot Interferometer)

FORCAST filter set bandpasses superposed on a model atmospheric transmission plot in the FORCAST wavelength coverage region (5-40 μm). The plot is output from ATRAN using 7.5 μm of precipitable water vapor at 45 degrees telescope elevation at an altitude of 41,000 feet. Approximate filter bandpasses are indicated by the widths of the colored columns (one for each filter). Column colors indicate the type of filter, listed in the legend below the plot. Selected point source continuum sensitivity estimates (noise level, Fν, 5-σ in 1 hour of integration) for these bandpasses are tabulated below. These estimates assume telescope emissivity ε=0.15 and a factor of 2 loss in S/N due to chopping off-chip. We account for diffraction and assume d_{80}=1.45" (optics) and d_{80}=2.54" (rms pointing stability). We use actual filter profiles for λ<12 μm (double half wave interferometer profiles otherwise) and our best estimates for window, mirror, and dichroic transmission. Final sensitivities will depend upon detector DQE and final SOFIA performance.

Band (μm)	λ/Δλ	Fν (mJy)	Band (μm)	λ/Δλ	Fν (mJy)
5.61	70	6.9	18.7	15	16
6.61	34	10	21.0	15	17
7.69	15	8.7	24.4	30	31
8.61	42	10	32.0	15	49
11.28	56	19	37.6	15	66

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